



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

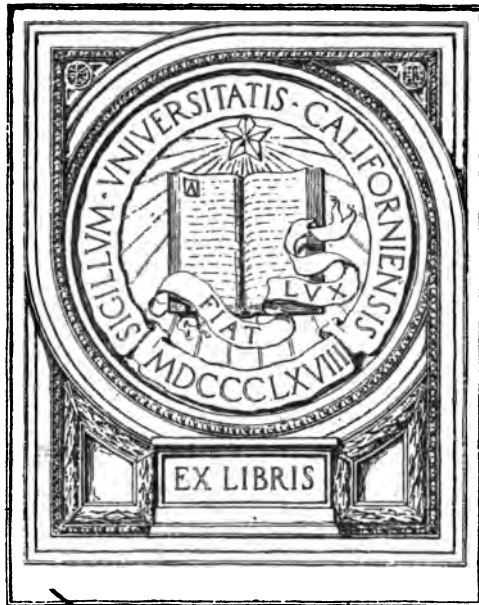
We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

GIFT OF



EX LIBRIS

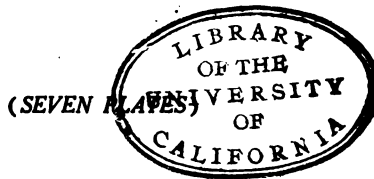
NOV 23 1917

not in set
12/13/17

No. 1688

INSTRUCTIONS FOR MOUNTING,
USING, AND CARING FOR
5-INCH BARBETTE CARRIAGES
MODEL OF 1896

BALANCED PILLAR MOUNTING



WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

UF643
A6
5inB
1917

71 2430
2007.10.13

INSTRUCTIONS FOR MOUNTING, USING, AND CARING FOR 5-INCH BARBETTE CARRIAGES, MODEL OF 1896, BALANCED PILLAR MOUNTING.

(SEVEN PLATES.)

GENERAL DESCRIPTION.

[The parts printed in italics are of importance or concern the safety of the carriage and should be specially noted.]

The gun is not provided with trunnions but is supported by and recoils in the cradle. Feathers on the top and bottom of the gun, which fit in keyways cut in the cradle, prevent rotation of the gun and guide its motion during recoil. A recoil band of forged steel is shrunk and keyed onto the gun to which the recoil and spring pistons are attached.

The cradle is made of bronze or of cast steel lined with bronze, and in addition to the bearing for the gun is provided with trunnions by which the gun and cradle are supported in the frame and about which they rotate when the former is elevated or depressed. The cap squares secured by a locking pin can be removed by drawing them outward. The trunnions are so placed as to be at the center of gravity of the system when the gun, with a projectile seated in the bore, is in the firing position. The trunnions rest in trunnion beds in the frame.

A recoil cylinder and two chambers for the counter-recoil springs are formed on the underside of the cradle. The rear end of the recoil cylinder is closed with a stuffing box through which the recoil piston rod passes; the front end of the cylinder is closed by a plug carrying the counter-recoil buffer, which enters an axis hole in the piston rod. The front ends of the spring chambers are open and the spring piston rods pass through holes in the rear ends which are solid with the cradle.

The sights and elevating rack are attached to the cradle.

The recoil piston rod, which is forged solid with the piston, is attached to the band on the gun by a nut and check nut.

Each spring piston rod, also forged solid with its head, is attached to the band by two nuts. The length of the rods is so proportioned and their rear ends threaded a sufficient distance as to enable the springs to be assembled to their prescribed initial height by means of the rear nut.

The counter-recoil springs on each spring rod are composed of helical springs divided into three sections by two bronze separators. Each section is composed of two coils, the inner coil being right-handed and the outer left-handed.

In recoiling, the gun moves to the rear in the cradle about 12.5 inches, carrying with it the piston and spring rods, and compressing the recoil springs. A small portion of the energy of recoil is

taken up in compressing the springs, but the greater portion by the resistance which the oil in the cylinder offers to being forced through the orifices in the piston. A throttling bar is secured to each side of the interior of the cylinder and passes through a slot in the piston. The sectional areas of these bars are made so that the orifices for the flow of the liquid, varying with the position of the piston during recoil, will give a constant resistance.

At the end of the recoil of the gun, the springs return it to the firing position. The velocity of counter recoil is checked by the oil caught in the axial hole in the piston rod being able to escape only through a small and decreasing clearance between the counter-recoil buffer and the walls of the hole. Lugs on the cradle limit its final motion forward by abutting against the cradle.

To the front of the frame is bolted the inner shield, made of 3-inch nickel steel. The front shield, of 1.25-inch nickel steel, is bolted to the ends of the inner shield, and the top shield, of 0.375-inch nickel steel, is hinged to the front shield in such manner as to allow it to be raised in front when firing at an increased elevation, or when it is desired to increase the field of view. A locking pin secures the shield in either bottom, middle, or top position. The top shield is provided with an aperture through which the sighting is done.

The frame is bolted to the racer, which consists of a single piece of cast steel 45 inches in diameter. In the center there is a bronze-bushed hole 5 inches in diameter, which fits over a corresponding projection on the base ring, forming a pintle. The upper roller path is formed on the underside of the racer. An observation hole through the flange at the right side facilitates the oiling, examining, and cleaning of the rollers and paths.

There are two clips bolted to the racer, one in front and one in rear, which clip under a flange on the base ring. These prevent the racer from overturning when the gun recoils or when it returns "into battery."

The racer rests on a circle of sixteen live, traversing rollers, running on forged-steel radial pins, riveted into a forged-steel roller ring. The rollers are conical in shape, of forged steel 4 inches in diameter at the large end, bushed with bronze and flanged to hold the system concentric on the base ring.

The base ring, made of cast steel, 47.7 inches in diameter, is bolted to the top of the pillar by twenty-four bolts. It centers the racer and has the lower roller path formed on its upper surface.

The pillar is made of half-inch steel plate, in halves riveted together, and is 49.5 inches in outside diameter and 9 feet 10.5 inches high. It has two bronze bearing bands, so placed as to give the longest possible length of bearing on the cylinder when the pillar is "racked up" in position for firing. It is strengthened on the interior by three pairs of longitudinal angle irons, which also serve as points of attachment for the chain brackets and form spaces in which the suspension chains run. Near the top of the pillar is a manhole with a plate cover fastened by bronze screws. A rack on the side of the pillar meshes with a pinion carried in a covered pocket at the top end of the cylinder.

The cylinder is made of cast iron and has an inside diameter of 50.5 inches and a height of 10 feet. To the bottom is bolted a

forged-steel plate, to which is bolted a second plate of cast iron, having sockets for three vertical posts. Suspension chains pass over pulleys supported on the tops of the posts which thus bear the entire weight of the rising parts and counterweight. A man-hole near the bottom, reached through a well and tunnel in the concrete platform, affords entrance underneath the counterweight for inspection and cleaning.

The pinion can be operated by two men with ratchet levers on the ends of the pinion shaft to raise or lower the gun and carriage. The construction permits a vertical movement of about $3\frac{1}{2}$ feet. By means of a screw friction clamp the pinion is made to hold the carriage against any sudden downward shock. The lugs at the upper end of the cylinder are fitted with locking pins, chained to them for locking the carriage in its lowest position. The flanges cast on the cylinder at the bottom and near the middle are for holding the cylinder more firmly in the concrete platform. A bronze dust guard secured to the top of the cylinder fits snugly about the sides of the pillar and prevents the entrance of dirt and water.

The counterweight forms a cylindrical pile 46 inches in diameter and 46.5 inches high, and is composed of two cast-iron sections, two lead sections, and several small lead weights. The sections are assembled on a suspension rod, a double-coil spring being inserted between the head on the lower end of the rod and the bottom of the counterweight. The suspension rod passes up through an equalizing yoke, and is held on top by a suspension-rod nut and check nut. The yoke is coned out and the lower nut and yoke are fitted together with a spherical surface to permit such movement as to equalize the strain on the three suspension chains. These chains are secured at one end by means of a clevis to the arms of the equalizing yoke, and pass over pulleys whose axles are free to roll on forks secured to the top of the posts. The other ends of the chains are fastened to brackets riveted between the stiffening angle irons inside the pillar. To fasten the chains, a short rod at the end of each chain is passed through a vertical hole in the bracket, after which a collar is keyed on below the bracket to prevent the withdrawal of the rod.

A loading platform of steel angles and plates, with a yellow-pine floor, is bolted to the rear of the frame, thus traversing with the gun. A short steel ladder may be hooked over the rear flange of the platform on either side. It is so arranged as to fall off should the carriage be "racked down" before its removal.

The traversing handwheel is operated by the right hand of the man at the sight. The traversing shaft and worm are of forged steel made in a single piece. It runs in bronze-bushed bearings in the cast-iron worm-wheel case which is partly filled with oil. The worm actuates a worm gear secured to a vertical shaft at the lower end of which is secured a bronze pinion which meshes into an internal traversing gear of steel secured to the base ring. The pinion shaft runs in bronze-bushed bearings, and must be assembled in its case with its gears before the case is bolted to the racer. The elevating handwheel is operated by the left-hand of the man at the sight. The handwheel shaft runs in bronze-bushed bearings, and actuates through bronze miter gears, the elevating shaft

and worm, of steel forged in one piece, running in bronze-bushed bearings in the worm-wheel case, partly filled with oil. The worm wheel consists of a bronze worm-wheel rim centered on a cast-iron disk. The rim is provided with two flanges, one fixed, the other movable. Both are held frictionally between three cast-iron disks which are free to slide lengthwise on two feathers on the pinion shaft, while turning with it and the pinion. The outer disks have long hubs extending through and rotating in the bronze-bushed bearings for the pinion shaft. The extended hubs abut between a shoulder on the shaft and a bronze washer confined by a nut which is accessible from the outside of the case. By an adjustment of this nut such pressure can be obtained between the cast-iron disks and the lugs on the worm wheel that the worm gear shall elevate and depress the piece, at the same time slipping under a violent shock of recoil. The inner end of the pinion shaft extends through a bronze-bushed bearing and is square to receive the steel elevating-pinion meshing in the bronze elevating rack which is bolted to the left side of the cradle.

This gearing is carried by the elevating bracket, which is bolted to an arm extending rearward from the left side of the frame. The worm gear and friction disks are incased between this bracket and the elevating worm-wheel cover. The elevating miter gears are incased between the elevating bracket and the shoulder rest, which bolts to it, and which carries, bolted in a vertical position at its rear end, a 2.5-inch rubber tube. By means of this rubber tube the shock of discharge is so diminished at the gunner's shoulder that he may fire the piece without removing his shoulder from the rest. The rear edge of the elevating rack is graduated with a least reading of 6 minutes, from 5 degrees depression to 15 degrees elevation. Bolted to the pinion-shaft boss and abutting in smooth contact with the rack graduation is a bronze pointer having a zero mark. By means of this scale and pointer the piece can be given its quadrant elevation without the use of a gunner's quadrant.

Drainage holes are provided for all pockets, and trunnions and all journal and sliding bearing surfaces are provided with oil holes closed with screw plugs easily removed with the fingers.

Before firing, and at least once a week, the cylinder, having a capacity of about 1.75 gallons, should always be filled with the hydrolene oil of specific gravity of about 0.85. To fill the cylinder, depress the gun to its full extent, remove the filling plug, and carefully fill the cylinder. Due to the inclosed air, the cylinder may appear to be filled when it is not actually so. Filling should continue until the oil appears in the filling hole, after the funnel has been removed. To empty the cylinders, elevate the piece slightly and remove both filling and drain plugs.

A recoil band, two ratchet levers, and the necessary tools and implements, neatly packed in an iron box, are furnished with each carriage. The boxes are marked with the number of the carriage and are furnished with a lock. A list of tools in each box is affixed to the underside of the lid.

The counterweight is designed to balance the weight of the rising parts. A sufficient number of small lead weights should be used so that the same effort is required for racking either "up" or "down."

SIGHTS.

These carriages are provided with open sights and electric night sights, the front and rear sights being each inserted in a bronze bracket bolted permanently on a seat on the cradle in a carefully adjusted position (Plate IV).

The front-sight socket is so made that the sight stem with its bayonet stud can be inserted, given one-fourth turn and locked against turning back by pushing the tongue on the lower end of a bushing free to slide vertically on the upper end of the stem, down into a slot below the bottom of the counterbored part of the sight socket, thus securing the sight against disarrangement. The sight consists of a 0.15-inch bead protected by a ring, and is located directly over the trunnion, thus reducing the size of the observation hole in the armor as much as possible.

The rear-sight bracket carries incased at its outer end a spur and worm wheel operated by a worm and small handwheel projecting to the rear, convenient to the cannoneer's right hand. The outer side of this case, after the removal of five screws and the worm, can be unscrewed and removed, thus bringing away all the gearing. The sight shank is an arc of an internal gear whose radius is equal to its distance from the front-sight bead and is inserted downward through the opening in the case, being pressed firmly to the right by a flat bronze spring to prevent play. A German-silver strip, dovetailed up the back of the stem and graduated to 6 minutes, is read through an observation hole in the rear of the case, which is provided with a zero mark on German silver. Outside the case on the same shaft with the spur wheel a drum is held frictionally between washers, so that when the sight stem is run down to zero the drum may be adjusted to also read zero and then be tightened.

Drums are provided for each of several charges with their resulting muzzle velocities and are graduated and marked on the German-silver periphery for each 100 yards of range.

The rear sight proper consists of a thin ring 0.16 of an inch inside diameter, secured to a sliding piece which has a lateral movement of 2 degrees each side of the center. The lateral motion is given by a screw which projects at each end beyond the side to receive the knurled thumb piece. The slide cover, of German silver, is attached by four screws to the rear face of the slide. The deflection scale stamped on it is graduated to 3 minutes and is read from a zero mark on German-silver bead on the rear side of the sliding part.

The front electric night sight consists of a fitting and stem which can be inserted in the bracket in place of the bead sight. This fitting receives an incased white electric light, which illuminates a glass cone set under a pierced cap, so that the point of the cone only is visible as a bead to be used in aiming. The light proper is shipped into a holder and down over two plug pins, to the other end of which the cable wires are soldered. The plug is drawn back into the holder after attaching the cables and is retained in position by a gland which pinches a soft-rubber washer around the cable. The holder is inserted in the case where it is secured by a bayonet catch, the case now being inserted into the fitting to be retained by a second bayonet catch.

For use at night the rear edge of the rear-sight ring is grooved and the groove baked full of scarlet enamel, which is illuminated by an incased red electric light, fitted similarly to the front light, the case being inserted in a bracket which is a part of the sliding part and deflects with it. This light may be quickly detached and used to illuminate the rear-sight graduation.

ELECTRICAL ATTACHMENTS.

The electrical power for lighting the night-sight lamps is obtained from a battery of ten "O. K." dry cells No. 4. These are carried in a battery box which is secured in brackets on the left side of the frame. When the cells and connections are in good condition, four cells should be connected in series with each lamp, the other two cells being held in reserve until needed. Each lamp requires about 0.35 ampere at 4.5 volts to light it properly.

The battery box carries two rheostats, one of which should be connected in each lamp circuit. Each rheostat is provided with a knurled thumb screw, the rotation of which serves to vary the resistance from 20 ohms to 0, a pointer being provided to indicate its status.

Before attaching the cables to the battery this pointer should point to the "off" position. When it is desired to use the sights, the pointers should be moved away from this position until the lamps begin to faintly glow.

It will be found that in general the most satisfactory sighting can be done *when the lamps give the faintest possible light*, since strong light interferes with the view of the target. To maintain the lights at the desired degree of brightness the setting of the rheostat pointer should be varied from time to time, so as to gradually reduce the resistance in the circuit.

On account of the comparatively limited power in the batteries the lamps should be kept lighted no longer than necessary. During any considerable interval in firing the pointer should be moved to the "off" position.

As a protection against possible short circuits in the lamps or cable connections the plug connections should habitually be removed from the battery boxes, except during the drill hours.

The electrical power for firing is obtained from two "O. K." dry batteries, each consisting of six cells in series. These batteries are not used simultaneously, but one is kept for use in case the other should fail. Each battery is stowed in a covered box, carried in brackets bolted to the side frames. A third box is similarly carried for storing the alternative firing cable. The battery carried on the left is ordinarily used to fire the piece through the pistol connection. The one on the right is used with the alternative firing key.

One terminal of each battery is attached by a short cable to the frame of the carriage as an earth connection.

The other terminal of the battery on the left side of the frame is connected by a cable, 4 feet long, with the front nipple under the pistol. When the trigger is pulled, the circuit is completed to the rear nipple, from which a cable 5 feet 5 inches long, passing under the cradle and through a twisted hook to the right side, connects

with the contact-surface plug. This is bracketed to the cradle in such position that when the piece is returned "into battery" the contact pin, pressed out by a spring in the contact-pin plug, attached to and moving with the recoil band and piece, presses upon the contact surface of the plug before mentioned. The connection for the next shot is thus made. From the contact-pin plug the firing-pin cable extends under a clamp on the block carrier, and a second one on the gear segment to a contact piece on the carrier. A second cable connects to the firing mechanism a corresponding contact piece on the gear segment. To enable the cannoneer who fires the piece to ascertain whether the breechblock is entirely closed and the connections otherwise complete, a buzzer is encased with the pistol, so that when the button over the trigger is pressed by the thumb a circuit is completed through a resistance coil, *which if kept on for an instant only* permits just enough current to pass to sound the buzzer, but not enough to explode the primer. The ear should be held close to the buzzer to detect the sound. When the trigger is pulled the resistance coil is cut out and a direct circuit is completed, permitting sufficient current from the battery to pass through the primer to fire the piece.

In case the pistol or its connections become short-circuited, or the insulation fails, the cable can be quickly disconnected from the battery and firing pin and the pistol lifted out of its slot. The surface contact plugs are then disconnected by withdrawing the locking pins which engage with bayonet studs in the contact-plug block, after which another pistol and cables may be applied or the alternative firing key and cables used.

In the alternative battery, in the front box on the right side of the frame, one terminal is directly connected with the firing pin through the alternative firing key and cables about 11.5 feet long. The length of these cables is such that the key may be taken under the piece to the left side and used by the cannoneer aiming.

The alternative key consists of a tube into one end of which a cable end is coupled fast. The cable entering the other end is secured to a plunger which is held out by a coiled spring. When grasped in the hand with the thumb on the plunger end the cable ends may be pushed together, completing the circuit. To guard against a premature discharge of the piece, a split key is wired to this firing key to prevent forward movement of the plunger. This should be kept pushed under the plunger head until the piece is about to be fired. When not in use, the alternative firing key and cables are stowed in the rear box on the right side of the frame.

TO ASSEMBLE THE CARRIAGE.

The carriage, when received at a fort, will usually consist of the following pieces:

1. The cradle, with piston and spring rods, and elevating rack in place.
2. The frame, with racer, loading platform, traversing and elevating mechanism in place.
3. The pillar with the base ring bolted to it.
4. The cylinder.
5. The counterweight.

6. The shields.

7. The posts, separator, counterweight chains, pulleys, and other small parts.

The following description refers particularly to the order in which the parts should be assembled. In assembling the parts a crane or pair of shears capable of lifting about 5 tons will be found very convenient.

All machined parts, including all joints, keys, bolts, bolt holes, and working parts should be thoroughly cleaned (with fine emery cloth if necessary) and oiled with good lubricating oil before being assembled.

On the arrival of the carriage at a fortification, the emplacement will be prepared for it by setting a bed of concrete for the bottom plate of the cylinder and with the necessary drain holes, as shown on the platform plate. The cylinder is let down so that the bottom plate rests on the concrete bed, and the cylinder is made nearly vertical by using a level and straightedge on the upper edge of the cylinder. The necessary centering is now made for communication to the manhole in the cylinder. The cylinder is then carefully reset, using a plumb line suspended in its center from the upper edge of the cylinder, with plumb bob almost touching the base plate. The position of the plumb line at the top and bottom of the cylinder is now carefully calipered, and the cylinder is adjusted until the plumb line coincides with the axis of the cylinder. (Experiment has demonstrated that a cylinder as set by using a level on the upper edge was out of the vertical $\frac{1}{4}$ inch, as shown by the plumb-line method.)

The inside of the cylinder and the post sockets should be thoroughly cleaned of any rust which may have collected, and should be well greased. The posts, suspension rod, forks, chain pulley, and separator should all be painted before being assembled.

The posts are now placed in their sockets, and care should be taken that each post is in its proper socket, which is indicated by corresponding figures or letters. Three pieces of about 12 by 12 inches, oak or yellow pine, are cut off to *exactly* the same length, say about 18 inches, and these are passed through the manhole and are placed on the bottom plate, so as to support the counterweight. The bottom piece, with the suspension rod and springs, is now let down until it rests on the three supports placed on the base plate. The remainder of the counterweight is now assembled, the separator is put in place, and the forks and chain pulleys attached. The equalizing yoke is now placed over the suspension rod, and the nut and check nut screwed down, *so that four inches of the thread on the rod shall be above the check nut*. If adjustment is necessary after the carriage has been assembled, the counterweight must be raised and the top carriage supported before the check nut can be unscrewed. The chains are assembled to the equalizing yoke, and the pillar is lowered into the cylinder; when the pillar has been lowered sufficiently, the chains are passed over the pulleys and fastened to the chain brackets on the pillar. The lifting-pinion friction clamp is now secured to the cylinder and the pocket cover screwed down. Had the pillar been assembled with the counterweight at the bottom of the cylinder, it would have been difficult to assemble the

pinion to the pillar rack.) The internal gear is now secured to the base ring and roller ring, and rollers are placed on the lower roller path after being first thoroughly cleaned.

The racer is then put in position and the racer clips, the frame, the front and inner shields, and the loading platform bolted on.

Before placing the cradle over the gun carefully examine the gun and cradle bearings, removing with emery cloth all rust that may have accumulated or any burrs that may have formed on these surfaces. Lubricate well the bearing surfaces on the gun and cradle. Before placing the cradle on the gun it would be well to unscrew the stuffing box and then screw it up as tight as one man can comfortably make it, using the open wrench furnished for the purpose. If the packing is to be examined, the oil must first be removed from the cylinder.

The cradle is put on the gun from the muzzle and is in proper position when against the stops on the gun. The cradle should be capable of being moved along the sliding surfaces of the gun in either direction, using not to exceed three men to start it. The position of the piston rod is determined by a shoulder, but the nuts on the spring rods should be so adjusted as to make the total length of the springs on each rod not to exceed 46.5 inches.

The gun, with the cradle, can now be raised and the trunnions of the cradle placed in the trunnion beds on the frame.

The top shield is now put in position, and the shoulder guard, sight brackets, and sights attached to the cradle. The three wooden blocks supporting the counterweight are now removed through the manhole, the carriage having been "racked down" sufficiently to permit their easy removal. The carriage is now "racked up" until the counterweight rests on the base plate, and the nut and check nut on the suspension rod unscrewed until the top bronze band on the pillar is 1 inch below the top edge of the cylinder.

It may be stated generally that in assembling carriages no part should be struck directly with a steel hammer and that only copper drifts, or copper or lead hammers, should be used.

When two bearing surfaces are brought together it is especially necessary that both surfaces should be absolutely clean, smooth, and well lubricated.

After the carriage has been completely assembled and the gun mounted the following points should be noted:

1. See that the pillar is vertical and does not bear excessively at any point on the inside of the cylinder.
2. See that the carriage traverses easily all around.
3. See that the carriage can be raised and lowered with equal ease.
4. Examine and clean out all oil holes.
5. See that the counterweight chains bear equal weights and are not twisted.
6. See that on firing the gun does not strike hard against its stop on going into battery.
7. Verify the graduations on the elevating rack.
8. See that the vertical planes containing the line of sight and the axis of the bore are parallel.

CARE OF CARRIAGE.

When in use all bearing parts must be thoroughly cleaned and lubricated. Special attention should be given to the lubrication of the bearing of the gun in the cradle, trunnions, rollers, pintle surface, elevating, traversing, and lifting mechanisms, including the teeth of all gears and racks. All oil holes should be cleaned out occasionally to keep them free from sand and grit.

The above parts should be lubricated at intervals whether the carriage is in use or not, and it is essential for the proper preservation and working of the carriage that every day on which it is to be manipulated for any purpose that all bearings be well lubricated.

In general no parts should be allowed at any time to rust; and if the carriages are to remain unused for short intervals, all bright and bearing parts should be covered with a thick coat of petrolatum. If the carriages are to remain unused for long intervals, a mixture of 75 per cent of petrolatum and 25 per cent of resin should be applied. This mixture is well adapted for the purpose but must be renewed from time to time. The rollers and roller paths should be cleaned and covered with petrolatum, the clearance between the racer and base ring and also between the flange of the pillar and the cylinder should be filled with waste or oakum or with a piece of burlap forced in to keep out dust. The pintle bearing should also be covered with a piece of burlap.

The habitual position of the carriage when not in use is lowered, but at intervals it should be raised and the gun traversed.

Experience has indicated that the oil should not be removed from the recoil cylinder when carriage is to remain unused for a considerable period, as the walls of the cylinders soon become dry and then rust.

It is especially required that carriages be kept free from rust. If this is allowed to accumulate, its removal from all bearing parts, and especially the piston rod, requires particular attention in order that clearances shall not be unduly increased. The use of sandpaper for this purpose is forbidden, and emery cloth No. 1, being coarse enough for any ordinary rusting, should be used, the rust being softened, if necessary, by kerosene.

Synovial oil should be used to lubricate all bearings.

Kerosene oil is issued by the Ordnance Department for cleaning purposes only.

A special grade of neutral oil, having a specific gravity of about 0.85, is furnished for filling the recoil cylinder, and a barrel of this oil should be kept on hand to replace leakage.

Tables of supplies for the above purposes are published from time to time by the Ordnance Department.

In general three coats of paint will be given carriages the first year; two coats annually thereafter will probably suffice, the actual needs depending somewhat upon the climate and local conditions. Before painting, surfaces should be rubbed smooth and made perfectly clean and dry. As soon as the carriage is completely assembled and the piece mounted all parts which have been marred in transportation will be primed, after which one complete coat of olive paint will be applied.

All steel and iron nonbearing surfaces, both inside and out, will be painted. The following parts are not painted: all wearing or bearing surfaces, which includes the handles of handwheels, teeth of all gear wheels and racks, rollers and surfaces on which they travel, piston rods, etc.

The paint supplied for the above purpose is Graphite, No. 38.

The paints mentioned above will be furnished in original packages, mixed ready for use. In all cases before using, the contents of the package should be thoroughly stirred with a wooden paddle; if thinning is desired, linseed oil is used.

A mixture of 75 per cent of petrolatum and 25 per cent of resin is used for slushing the bore of the gun for which two applications per year are considered sufficient although more may be required.

The petrolatum alone should be used in the screw threads of breech mechanism.

To oil the bore, use is made of an ordinary counter brush secured to the end of a rod and provided with a half disk of wood to keep the brush against the bore. By this means any required thickness of the mixture may be applied. The brush rod is fitted with a socket for connecting it with the special sponge staff. As a rule, the petrolatum and resin mixture can be sufficiently removed from the bore for firing by using the *scraper* alone, this being a semi-circular disk of iron. The scrapers are fitted for attachment to the staff of the special sponge.

The entire removal of the petrolatum mixture from the bore by hand is only necessary for star gauging, or whenever it is desired to inspect the bore. To affect this, as much as possible of the mixture should first be removed with the scraper. A sponge is then dipped in a solution of concentrated lye and passed through the bore. This softens and partially dissolves the coating. Burlap is then wrapped around the special solid-head sponge, the whole being made of such diameter that it requires eight or ten men to pass it through the bore. This considerable pressure against the bore is necessary in order to reach the bottom of the grooves. For covering the sponge the burlap should be cut from 4 to 8 inches longer than the head, and the selvage laced together with packing needle and twine.

After firing, the powder residue is removed by using either the spring or special cleaning sponge well saturated with water. To completely effect this the burlap is used, one or two thicknesses being secured over the head of the sponge.

To prepare the mixture of petrolatum and resin, melt the ingredients separately, pour them together, then boil the mixture slowly with repeated stirrings for one hour.

As far as possible, all lubricants should be kept from electrical contact surfaces, as a thin layer of oil will prevent proper contact. For the same reason, slushing the electrical holders containing insulating material such as vulcanite is undersirable, as the oil works in around this material and gradually oozes out on the surface, coating the contact surfaces.

Once or twice each year the gun should be so far removed from its cradle that the interior of the cradle and the bearing part of the exterior of the gun can be thoroughly cleaned and oiled. The gun

and mount should at such times be jacked up sufficiently for examining and cleaning any bearings or bearing surfaces that are at other times inaccessible.

When not in use, the sights should be removed from the mounts, and, after being carefully oiled, should be stored in a dry place. The sight brackets on the mount should be kept filled with a plug of greased tow, to keep out water and dirt, and should be frequently examined, to prevent rusting.

Electrical attachments for night sights and firing purposes should receive care similar to that given the sights. On account of the necessarily limited energy in the batteries and the ease with which the lights can be turned on and off, the night sights should not be kept lighted unnecessarily.

Weights of the parts of the 5-inch barbette carriage, model of 1896, balanced pillar mounting.

Num-ber.	Name of part.	Weight.
		<i>Pounds.</i>
1	Cylinder with bottom and base plate and dust guard.....	10,255
1	Pillar with base ring and traversing internal gear.....	5,835
16	Traversing rollers.....	184
1	Frame, including racer, loading platform, elevating and traversing brackets, gear, worms, and shafts.....	2,710
1	Shields, front, inner, and top.....	3,170
1	Shoulder rest with bolts, etc.....	85
1	Cradle with elevating rack, springs, spring and piston rods, and stuffing box.....	1,900
2	Handwheels.....	29
2	Battery brackets.....	38
2	Locking pins.....	4
1	Lifting pinion.....	38
2	Ratchet levers.....	43
3	Forks.....	204
3	Chain pulleys.....	244
3	Posts.....	825
1	Separator.....	54
1	Suspension bolt, with springs and nuts.....	175
1	Distance ring.....	117
3	Chains with attachments.....	130
1	Ladder.....	25
1	Recoil band.....	150
2	Racer clips.....	74
1	Implements with box.....	112
	Total carriage.....	26,401
	Counterweight.....	22,408
	Carriage complete with counterweight.....	48,809

Names of the parts of 5-inch barbette carriage, model of 1896, balanced pillar mounting.

[Abbreviations for the materials of which the parts are made are as follows: Brass, Bs.; bronze, Bz.; cast iron, C. I.; cast steel, C. S.; forged steel, F. S.; nickel steel, N. S.; steel plate, S. P.; German silver, G. S.; lead, Ld.; vulcanized fiber, V. F.; wrought iron, W. I.]

Name of part.	Material.	Number.	Diameter or width.	Length or thickness.	Nuts.	Remarks.
			<i>Ins.</i>	<i>Ins.</i>		
Base ring.....	C. S., No. 2.	1	47.7	10.25		
Base-ring bolts.....	F. S.	24	1	3.125	24	
Cap squares.....	C. S., No. 1.	2	8.5	4.5		
Cap-square locking pins.....	S.	2	1	6		Each with chain and eye screw.
Cap-square oil plugs.....	Bz.	2	.375	.75		
Counter-recoil buffer and stem.....	Bz., No. 3.	1	5.5			
Counter-recoil buffer gasket.....	V. F.	1	5.5	.06		4.5 diameter of hole.
Counter-recoil springs.....	F. S.	6	4.5	{ about 18 }		
Counter-recoil spring rods.....	F. S., No. 2.	2	2	71	4	Forged solid; piston 5 inches diameter.
Counter-recoil spring separators.....	Bz.	8	4.75			Four 2 inches and four 1 inch long.
Counterweight, bottom layer.....	C. I.	1	46	18		
Counterweight, intermediate layer.....	C. I.	1	46	13.5		
Do.....	Ld.	1	46	10		
Do.....	Ld.	1	46	11		
Counterweight, top layer.....	Ld.	21	46	6		Detachable pieces.
Counterweight handles.....	W. I.	6	.5	7		One cast in each of 6 pieces of top layer.
Do.....	W. I.	12	.5	4.25		One cast in each of 12 pieces of top layer.
Counterweight spring, outer.....	F. S.	1	8	{ about 14 }		
Counterweight spring, inner.....	F. S.	1	{ about 5.5 }	{ about 14 }		
Counterweight staples.....	W. I.	8	.75	9.5		Two cast in each layer.
Do.....	W. I.	6	.5	7.5		Two cast in each outer piece, top layer.
Cradle.....	Bz., No. 3.	1	22.5	53.5		
Cradle oil plugs.....	Bz.	2	.625	1		
Cylinder.....	C. I., No. 2.	1	58.5	10 feet		
Cylinder base plate.....	C. I., No. 2.	1	32.5	6		
Cylinder base-plate bolts.....	F. S.	3	.75	3.125	3	Countersunk heads.
Cylinder bottom plate.....	F. S.	1	58.5	1		
Cylinder bottom-plate bolts.....	F. S.	12	.75	3.5	12	
Cylinder dust guard.....	Bz.	1	53.5	.25		In halves.
Cylinder dust-guard screws.....	Bz.	22	.5	1		Countersunk heads.
Elevating bracket.....	C. S.	1	10.25	29		One 5 x 1.25 pin, Bz., forced in pistol groove.
Elevating bracket bolts.....	F. S.	2	1	3	2	
Elevating bracket tap bolts.....	F. S.	3	1			
Elevating bracket oil plugs.....	Bz.	2	.375			
Elevating handwheel.....	Bz.	1	14	1.25		
Elevating handwheel handle.....	F. S.	1	.875	4.5		Riveted in rim of handwheel.
Elevating handwheel-handle tube.....	Bz.	1	1.125	4.25		
Elevating handwheel shaft.....	F. S.	1	1	8.625		
Elevating handwheel-shaft key.....	F. S.	1	.31	1.4		Staked in shaft.
Elevating handwheel-shaft bushing.....	Bz.	1	1.375	1.25		Forced in elevating bracket, top end.
Do.....	Bz.	1	1.375	2		Forced in shoulder rest.
Elevating handwheel split pin.....	F. S.	1	.25			
Elevating miter gears.....	Bz.	2	3.5	1.25		One pair.
Elevating pinion.....	F. S.	1	4	1.75		
Elevating pinion shaft.....	F. S.	1	1.75	1.75	2	Special.
Elevating pinion shaft keys.....	F. S.	2	.5x.5	7		Staked in shaft.
Elevating pinion shaft bushings.....	Bz.	1	3	6.5		Forced in elevating bracket.
Do.....	Bz.	1	3	2.25		Forced in elevating worm-wheel cover.
Elevating pinion shaft washer.....	Bz.	1	2.5	.375		
Elevation pointer.....	Bz.	1	4	3.5		
Elevation pointer tap bolts.....	F. S.	2	.5	1		
Elevation pointer adjustment.....	Bz.	1	1.625	1.5		
Elevation pointer adjustment tap bolt.....	F. S.	1	.5	.75		
Elevating rack.....	Bz., No. 3.	1	2.83	17.5		
Elevating rack bolts.....	F. S.	5	.75	2.25	5	Countersunk heads.
Elevating worm and shaft.....	F. S.	1	1	13.25		
Elevating worm and shaft bushing.....	Bz.	2	1.375	2.125		One .25 x .375 Bz. pin driven in each.
Do.....	Bz.	1	1.375	2.25		

Names of the parts of 5-inch barbette carriage, model of 1896, balanced pillar mounting—Continued.

Name of part.	Material.	Number.	Diameter or width.	Length or thickness.	Nuts.	Remarks.
Elevating worm and shaft key.	F. S.	1	<i>Ins.</i> .31	<i>Ins.</i> 1.25		Staked in shaft.
Elevating worm wheel.	Bz., No. 3.	1	{ 7.958 P. D. }	{ 1.375 face }		
Elevating worm-wheel friction disks.	C. I., No. 1.	3	6	{ 9.625 over all }		Inner, center, and outer.
Elevating worm-wheel friction ring.	Bz.	1	6.75	.375		A part of worm wheel.
Elevating worm-wheel friction ring dowels.	Bz.	12	.31	1.75		Driven in worm wheel.
Elevating worm-wheel cover.	C. S.	1	13.5	4		
Elevating worm-wheel cover tap bolts.	F. S.	7	.625	2.25		
Elevating worm-wheel cover oil plug.	Bz.	1	.375	.75		
Elevating worm-wheel cover pipe plug.	Bz.	2	.5	.75		
Frame.	C. S., No. 1.	1	34.75	49		
Frame tap bolts.	F. S.	18	1	2		
Do.	F. S.	2	1	3		
Lifting pinion.	F. S., No. 2.	1	{ 8.36 O. D. }	2.25		
Lifting pinion clamp block.	Bz.	1	1.875	2.25		
Lifting pinion clamp shoe.	Bz.	1	1.5	.5		
Lifting pinion clamp nut.	Bz.	1	2.5	2.85		Keyed in cylinder.
Lifting pinion clamp screw.	F. S.	1	1	.625		
Lifting pinion clamp-screw split pin.	F. S.	1	19	1.25		
Lifting pinion clamp-screw bushing.	Bz.	1	1.875	2.125		
Lifting pinion clamp-screw handle.	F. S.	1	1	7		
Lifting pinion shaft.	F. S., No. 2.	1	1.875	25		
Lifting pinion shaft bushing.	Bz.	1	2.5	6		Forced in cylinder.
Do.	Bz.	1	2	6		Do.
Lifting pinion shaft key.	F. S.	1	{ .437 x .375 }	2.25		Staked in shaft.
Lifting pinion shaft oil plugs.	Bz.	2	.375	.75		
Lifting pinion cover.	Bz.	1	5.5	8		
Lifting pinion cover tap bolts.	F. S.	4	.5	.875		
Lifting rack.	F. S.	1	7	108.5		Riveted in pillar.
Lifting ratchet levers.	F. S.	2		41.75		
Lifting ratchet-lever hub.	F. S.	2	3	3.125		
Lifting ratchet-lever hub nut.	F. S.	2	3	.375		
Lifting ratchet-lever hub-nut set screw.	F. S.	2	.25	.31		
Lifting ratchet-lever pawls.	F. S.	2	.75	2.625		
Lifting ratchet-lever pawl-pin.	F. S., No. 3.	2	.625	1.75		
Lifting ratchet-lever pawl-pin split pin.	F. S.	2	.125			
Lifting ratchet-lever pawl spring.	F. S.	2	.36	{ about 1.9 }		
Lifting ratchet-lever pawl-spring thimble.	F. S.	2	.5	1.45		
Lifting ratchet-lever pawl-spring thimble bushing.	Bz.	2	.625	.169		Forced in lever.
Lifting ratchet wheel.	F. S.	2	3.5	.75		
Lifting ratchet-wheel key.	F. S.	2	.5	.75		
Name plate.	Bz.	1	2.65	4		
Name-plate screws.	Bz.	2	.25	.5		
Pillar.	S. P., No. 1.	1	50.47	{ 9 ft. 10.5 in }		{Of plates, angles, etc., riveted together.
Pillar locking pins.	Bz.	2	1	5.75		Each with chain and eye screw attached.
Pillar manhole cover.	S. P.	1	17.25	19.25		
Pillar manhole-cover screws.	Bz.	12	.5	1		Countersunk heads.
Platform.	F. S.	1	6 feet	{ 7 ft. 10.25 in }		{Of plates, angles, etc., riveted together.
Platform tap bolts.	F. S.	6	1.125	1.75		
Platform studs.	F. S.	2	1.125	2.81	2	
Platform flooring.	Yellow pine.	15	6 feet	{ 4 ft. 6 in }		1.25 x 3 x 71.25 strips.
Platform flooring bolts.	F. S.	30	.375	1.75	30	
Platform ladder.	F. S.	1	11	42.25		
Racer.	C. S., No. 2.	1	45	6.5		
Racer bushing.	Bz.	1	6.5	4.5		Forced in pintle hole.
Racer clip, front.	C. S., No. 2.	1	.5	.625	60°	

Names of the parts of 5-inch barbette carriage, model of 1896, balanced pillar mounting—Continued.

Name of part.	Material.	Number.	Diameter or width.	Length or thickness.	Nuts.	Remarks.
Racer clip, rear.....	C. S., No. 2..	1	<i>Ins.</i> 3.625	<i>Ins.</i> 20°		
Racer-clip tap bolts.....	F. S.....	12	1	2		
Racer hand-hole cover.....	F. S.....	1	4.5	7.5		
Racer hand-hole cover tap bolts.....	F. S.....	4	.625	1		
Recoil band.....	F. S., No. 3..	1	19.25	6		
Recoil-band key.....	F. S.....	1	3.289	9		
Recoil-band key set screw.....	F. S.....	1	.625	.75		
Recoil piston and rod.....	F. S., No. 3..	1	3.75	34.5	2	Forged solid, piston 7 in. diam.
Recoil cylinder, filling and drain plugs.....	F. S.....	4	.875	3		
Recoil cylinder, filling and drain gaskets.....	V. F.....	4	1.875	.06		.875 in. diam. of hole.
Recoil stuffing-box.....	Bz., No. 3..	1	8.5	5.4		
Recoil stuffing-box gland.....	Bz., No. 3..	1	5.75	4.75		
Recoil stuffing-box gasket.....	V. F.....	1	8.5	.06		7.28 diam. of hole.
Recoil stuffing-box packing.....		2	.875	14.5		2 rings, Garlock waterproof hydraulic.
Recoil throttling bars.....	F. S., No. 2..	2	1	15.25		
Recoil throttling-bar bolts.....	F. S.....	2	.5	2.06		
Do.....	F. S.....	6	5	2.19		
Recoil throttling-bar bolt gaskets.....	V. F.....	8	1	.06		.5 in. diam. of hole.
Shield, front.....	N. S.....	1	50.125	74.4		
Shield, front, screws.....	F. S.....	14	.875	2.5		Countersunk heads.
Shield, front, hinges.....	C. S., No. 1..	2	4	{ about 26		
Shield, front, hinge screws.....	F. S.....	10	.875	2.375		Countersunk heads.
Shield, inner.....	N. S.....	1	28.5	57.75		
Shield, inner, studs.....	F. S.....	8	1	3.125	8	Points threaded 1 inch.
Shield, top.....	N. S.....	1	46.29	76.58		With 3 x .5 x .5 steel angle riveted on.
Shield, top, hinges.....	C. S., No. 1..	2	4	13.75		1 with operating handle cast on.
Shield, top, hinge screws.....	F. S.....	10	.875	2.5		Countersunk heads.
Shield, top, hinge tap bolts.....	F. S.....	2	2	4.75		
Shield, top, locking pin.....	F. S.....	1	1	{ about 5.75		With chain and eye screw.
Shield, top, arc.....	F. S.....	1	2.5	12		
Shield, top, arc pivot.....	C. S., No. 1..	1	3.5	6	1	
Shield, top, arc-pivot screws.....	F. S.....	2	.875	2.375		
Shoulder guard.....	Bz.....	1	{ about 20.5	30.5		
Shoulder-guard tap bolts.....	F. S.....	9	.625	1.125		
Shoulder rest.....	C. S.....	1	12	22.5		
Shoulder-rest tap bolts.....	F. S.....	3	1	4.125		
Shoulder-rest rubber tube.....	Rubber.....	1	2.5	12		
Shoulder-rest rubber-tube nut strip.....	Bz.....	1	{ about 1.5	12		
Shoulder-rest nut-strip tap bolts.....	F. S.....	3	.5	1.5		
Shoulder-rest oil plugs.....	Bz.....	2	.375			
Suspension chains.....	Bz.....	3	.6875	{ 8 ft. 8.5 in.		Each with eye shank and special link welded in.
Suspension-chain clevis.....	Bz.....	3	2.5	4.31		
Suspension-chain clevis pin.....	Bz.....	3	1	3.25		Each with 2 split pins.
Suspension-chain collars.....	Bz.....	3	2.5	3.375		
Suspension-chain collar keys.....	Bz., No. 2..	3	1.375	3		
Suspension-chain equalizing yoke.....	C. S., No. 2..	1	12	3.5		
Suspension-chain forks.....	C. S., No. 2..	3	6.25	15.5		
Suspension-chain fork taper pin.....	F. S.....	3	.5	6.5		
Suspension-chain pulleys.....	C. I., No. 1..	3	18.5	6		Each with F. S. axle forced in.
Suspension-chain brackets.....	F. S.....	3	5.25	8.5		
Suspension-chain posts.....	F. S., No. 1..	3	3.5	{ 8 ft. 7 in.		
Suspension-chain separator.....	C. S., No. 2..	1	28	1		
Suspension rod.....	F. S., No. 2..	1	2.25	64.25	2	1 nut with spherical under surface.
Traversing rollers.....	F. S., No. 2..	16	4	4.375		
Traversing roller bushings.....	Bz.....	32	1.375	1.25		2 forced in each roller.
Traversing roller ring.....	F. S., No. 1..	1	33	3		
Traversing roller pins.....	F. S., No. 2..	16	1	6		Driven and riveted in ring.
Traversing internal gear.....	C. S., No. 2..	1	30	4.375		
Traversing internal-gear screws.....	F. S.....	8	.75	1.625		
Traversing pinion.....	Bz., No. 3..	1	{ 4.667 O. D.	2.75		
Traversing pinion taper pin.....	F. S.....	1	.25	3		
Traversing pinion shaft.....	F. S.....	1	1.81	13		

Names of the parts of 5-inch barbette carriage, model of 1896, balanced pillar mounting—Continued.

Name of part.	Material.	Number.	Diameter or width.	Length or thickness.	Nuts.	Remarks.
Traversing pinion shaft bushing.	Bz.	1	Ins. 1. 75	Ins. 2		Forced in worm-wheel case.
Do.	Bz.	1	2. 25	3		Do.
Traversing pinion shaft key.	F. S.	1	. 5 x . 5	2. 5		Staked in shaft.
Traversing pinion shaft oil plug.	Bz.	1	. 375			
Traversing pinion shaft collar.	Bz.	1	3	1. 125		
Traversing pinion shaft-collar taper pin.	F. S.	1	. 25	3. 25		
Traversing worm wheel.	Bz., No. 3.	1	{ 7. 958 P. D.	1. 5		
Traversing worm-wheel case.	C. I., No. 1.	1	12. 75	9		
Traversing worm-wheel case tap bolts.	F. S.	5	. 875	1. 625		
Traversing worm cover.	C. I., No. 1.	1	5. 5	12. 75		
Traversing worm-cover tap bolts.	F. S.	8	. 625	1. 575		
Traversing worm-cover oil plug.	Bz.	1	. 375			
Traversing worm-cover pipe plug.	Bz.	3	. 5			
Traversing shaft.	F. S.	1	1. 25	66. 625		
Traversing shaft bushing.	Bz.	1	1. 625	2. 5		One . 25 x . 375 Bz. pin driven in.
Do.	Bz.	1	1. 625	2. 25		Do.
Traversing shaft-bearing.	Bz.	1	2. 25	4. 25		
Traversing shaft-bearing tap bolts.	F. S.	2	. 75	2. 875		
Traversing shaft-bearing oil plug.	Bz.	1	. 375			
Traversing handwheel.	Bz.	1	16	1. 25		
Traversing handwheel handle.	R. F. S.	1	. 875	4. 5		Riveted in handwheel.
Traversing handwheel-handle tube.	Bs.	1	1. 125	4. 25		
Traversing handwheels split pin.	F. S.	1	. 25			

SIGHTS, OPEN.

Front-sight bead.	F. S.	1	. 15	1. 45		
Front-sight bead ring.	F. S.	1	2. 1	. 875		
Front-sight bead-ring taper pin.	F. S.	1	. 19	1. 125		
Front-sight stem.	Bz.	1	. 81	3. 375		
Front-sight collar.	Bz.	1	1. 125	1. 94		
Front-sight bracket.	Bz., No. 1.	1	7	10. 5		
Front-sight bracket tap bolts.	F. S.	4	. 75	1. 625		
Front-sight fitting, for electric light.	F. S.	1	. 875	. 565		
Front-sight fitting taper pin.	F. S.	1	. 19	1. 125		
Front-sight fitting collar.	Bz.	1	1. 125	1. 94		
Front-sight fitting stem.	Bz.	1	. 81	3. 375		
Rear-sight shank and deflection slide.	F. S.	1	4. 375	{ about 16		
Rear-sight deflection window.	F. S.	1	1. 875	2. 375		With G. S. bead riveted on.
Rear-sight deflection screw.	Bz.	1	. 375	5. 25		
Rear-sight deflection wheels.	Bz.	2	1. 5	. 687		
Rear-sight deflection - wheel pins.	F. S.	2	. 063	. 625		
Rear-sight deflection scale.	G. S.	1	. 875	4. 375		
Rear-sight deflection - scale screws.	F. S.	4	. 156	. 5		
Rear-sight ring.	F. S.	1	. 7	. 25		
Rear-sight spring.	Bs.	1	. 87	3. 9		
Rear-sight spring screw.	F. S.	1	. 219	. 3		
Rear-sight elevation scale.	G. S.	1	. 44	16		
Rear-sight elevation - scale dowel pin.	F. S.	1	. 125	. 375		
Rear-sight bracket.	Bz., No. 1.	1	7	9. 875		G. S. zero mark dovetailed in.
Rear-sight bracket cover.	Bz., No. 1.	1	4. 5	{ about 5. 5		
Rear-sight bracket - cover screws.	F. S.	4	. 219	. 44		
Rear-sight bracket tap bolts.	F. S.	4	. 75	1. 625		
Rear-sight gears.	Bz., No. 1.	1	3. 7	1. 75		Combined worm-wheel and spur gear.
Rear-sight gear shaft.	F. S.	1	. 5	3. 25	1 Bz.	
Rear-sight gear taper pin.	F. S.	1	. 125	1		
Rear-sight disk, back.	Bz., No. 1.	1	2. 25	. 5		
Rear-sight disk, front.	Bz., No. 1.	1	2. 25	. 31		
Rear-sight drum.	Bz.	1	3. 75	. 5		With G. S. rim shrunk on.

Names of the parts of 5-inch barbette carriage, model of 1896, balanced pillar mounting—Continued.

SIGHTS, OPEN—Continued.

Name of part.	Material.	Number.	Diameter or width.	Length or thickness.	Nuts.	Remarks.
Rear-sight worm and shaft.....	F. S.....	1	<i>Ins.</i> 0.719	<i>Ins.</i> 5.25	.....
Rear-sight shaft bushing.....	Bz. No. 1....	1	.75	1.625	.....
Rear-sight shaft-bushing taper pin.	F. S.....	1	.19	1.25	.....
Rear-sight hand wheel.....	Bz.....	1	4	1.25	.....
Rear-sight hand wheel handle..	Bz.....	1	.625	2	.....
Rear-sight hand wheel handle pin.	F. S.....	1	.22	2.375	.....	Riveted in wheel.
Rear-sight hand wheel taper pin	F. S.....	1	.094	1	.....

ELECTRICAL ATTACHMENTS.

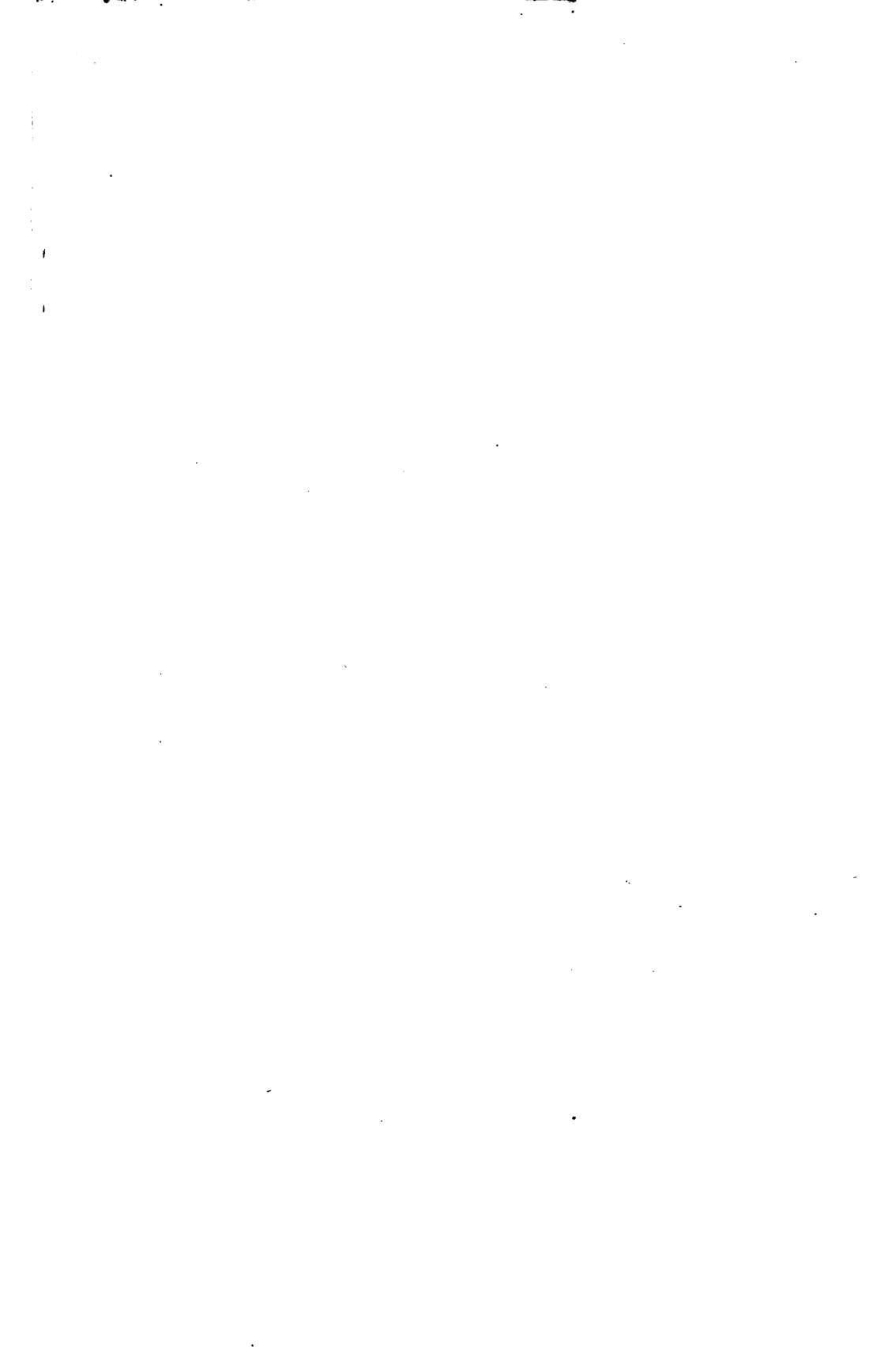
1 set night sights, consisting of 10 O. K. dry cells No. 4, and 2 rheostats, boxed, complete with front and rear electric lights, and plug connections.						
E. L. battery bracket, front...	F. S.....	1	6	5.75	.....
E. L. battery bracket, bolts...	F. S.....	2	.625	1.75	2	Countersunk heads.
E. L. battery bracket, rear...	F. S.....	1	6	8.31	1	
E. L. battery bracket, tap bolts	F. S.....	2	.625	1	.....
1 set firing cable, complete with battery, 4 pieces of cable, firing pistol, buzzer, and contact plugs.						
Firing-battery bracket.....	F. S.....	1	5.625	9.75	.....	On left side of frame.
Firing-battery bracket, bolts..	F. S.....	4	.625	1.75	4	Countersunk heads.
Firing-battery bracket, binding bolts.	F. S.....	1	.5	10.3	1	
Stud, for terminal.....	F. S.....	1	.25	2	2	
Twisted hook.....	F. S.....	1	1.125	2	.....
Surface-plug bracket.....	Bz.....	1	5.5	6	.....
Surface-plug bracket, tap bolts.	F. S.....	2	.75	1.75	.....
1 set alternative cable, consisting of battery, 3 pieces of cable, firing key, and storage box.						
Firing-battery brackets.....	F. S.....	2	5.5	9.5	.....	On right-hand side of frame.
Firing-battery brackets, bolts.	F. S.....	8	.625	1.75	8	Countersunk heads.
Firing-battery brackets, binding bolts.	F. S.....	2	.5	10.3	2	
Stud, for terminal.....	F. S.....	1	.25	.2	2	

IMPLEMENTS AND TOOLS.

Filling funnel.....	Copper.....	1	3	8.25	.....
Implement box.....	Sheet iron...	1	13	36	.....	With lock and key.
Implement-box list.....	Bz.....	1	5.25	6	.....	Riveted on inside of implement-box cover.
Oil can.....		1			.....
Oil can, locomotive.....		1			.....
S hooks.....	F. S.....	2	1.25	9.5	.....
Screw driver.....	F. S.....	1	1.5	30	.....
Do.....	F. S.....	1	1.25	24	.....
Do.....		2			.....	Small, handled, for sight screws.
Wrench, double fork.....	F. S.....	1		35	.....
Do.....	F. S.....	1		20	.....
Wrench, single fork.....	F. S.....	1			.....	For stuffing boxes.
Do.....	F. S.....	1			.....	For 2.25-inch nuts.
Wrench, monkey.....		1		10	.....

OFFICE OF THE CHIEF OF ORDNANCE, U. S. ARMY,

Washington, June 23, 1903.



YC 64335

Gaylord Bros.
Makers
Syracuse, N. Y.
PAT. JAN. 21, 1906

366224
U.S.

11-193
A6
S. 118
UNIVERSITY OF CALIFORNIA LIBRARY
1917